
Table of Contents

E70 Seats

Subject	Page
Introduction	4
Seat Equipment Options	4
Second Row Seating	6
Third Row Seating	7
Basic/Sport Driver and Passenger Front Seats	8
Driver Seat Adjustments	12
Driver Seat Heating	13
Seat Heating Power Reduction	13
Driver Seat Lumbar Support	14
Driver Seat Memory Function	14
Front Passenger Seat Adjustment	17
Front Passenger Seat Heating	18
Front Passenger Seat Lumbar Support	19
Front Passenger Seat Memory Function	19
Multifunction Driver and Passenger Seats	20
Seat Adjustments	24
Seat Heating	25
Quick Heating Area	25
Seat Heating Power Reduction	26
Lumbar Support Function	26
Seat Memory Function	26
Active Seat	27
Low Voltage	31
Active Seat Ventilation	32
Second Row Seats (Rear Seat)	34
Rear Seat Heating w/out Automatic Rear-cabin Air Conditioning	34
Rear Seat Heating w/Automatic Rear-cabin Air Conditioning	37
Second Row Seat Locking	40
The Large Seat Section	40
The Small Seat Section	40
Junction-Box ECU	41
Third Row Seat	42
Seat-position recognition, US version	42
Service Information	43

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Seats

Model: E70

Production: From Start of Production

OBJECTIVES

After completion of this module you will be able to:

- Describe the different seat options available on the E70
- Identify the different functions of the available seat options on the E70

Introduction

Seat Equipment Options

There is a comprehensive range of seat equipment for the E70. Essentially, there are three different seat models available.

The seat models are:

- Basic seat (Not for U.S. vehicles)
- Sport seat option
- Multifunction seat (comfort seat) option.

Semi-electric and electric versions of the basic seat are not offered in the U.S. An electric version of the sport seat is offered. The table below shows the different types of seat adjustment for the seat models.



Each has electric seat-height and backrest inclination adjustment. The seats can be expanded to include assorted electrical functions. These functions are listed in the table in the next page.

Electrical seat function	Basic seat				Sport seat				Multifunction seat				
	Driver		Passenger		Driver		Passenger		Driver		Passenger		
	1	2	1	2	1	2	1	2	1	2	1	2	
Seat-height adjustment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Longitudinal seat adjustment		✓		✓	✓		✓		✓	✓	✓	✓	✓
Seat-inclination adjustment		✓		✓	✓		✓		✓	✓	✓	✓	✓
Seat-depth adjustment									✓	✓	✓	✓	✓
Seat/backrest heating	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backrest-inclination adjustment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backrest-width adjustment									✓	✓	✓	✓	✓
Backrest-head adjustment									✓	✓	✓	✓	✓
Lumbar support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Head-restraint height adjustment		✓		✓	✓		✓		✓	✓	✓	✓	✓
Seat memory		✓			✓				✓	✓	✓	✓	✓
Active seat									✓				✓
Seat climate/ventilation									✓				✓

The front side airbag has been integrated in the backrest of the driver and front passenger seat.

Note: Further information on the side airbag, seat-occupancy recognition and the belt tensioner can be found in the Product Information "Advanced Crash Safety Management E70".

The multifunction seat can be ordered with the active-seat function. In contrast to the previous models, the seat cushion is moved no longer by electrohydraulic but rather by electro-pneumatic means. The advantage of electro-pneumatics lies in the fact that the overall weight of the seat is reduced. This in turn reduces fuel consumption and lowers damage to the environment by pollutants.

Second Row Seating

The E70 is a five-seater in its standard equipment specification, two seats in the front (driver and Passenger) and three seats in the row just behind the front seats. This is referred to as second row seating (back seat). It offers the opportunity of folding down the backrest completely, thereby increasing the luggage-compartment volume. The backrest are divided into two parts, the ratio being 60/40.

Front and Second Row Seating



Note: Rear Seat heating can be ordered as an option.

Third Row Seating

The Passenger seating capacity can be extended to seven by ordering the third row seating option. The additional two seats are situated in the luggage compartment and can be folded down completely.

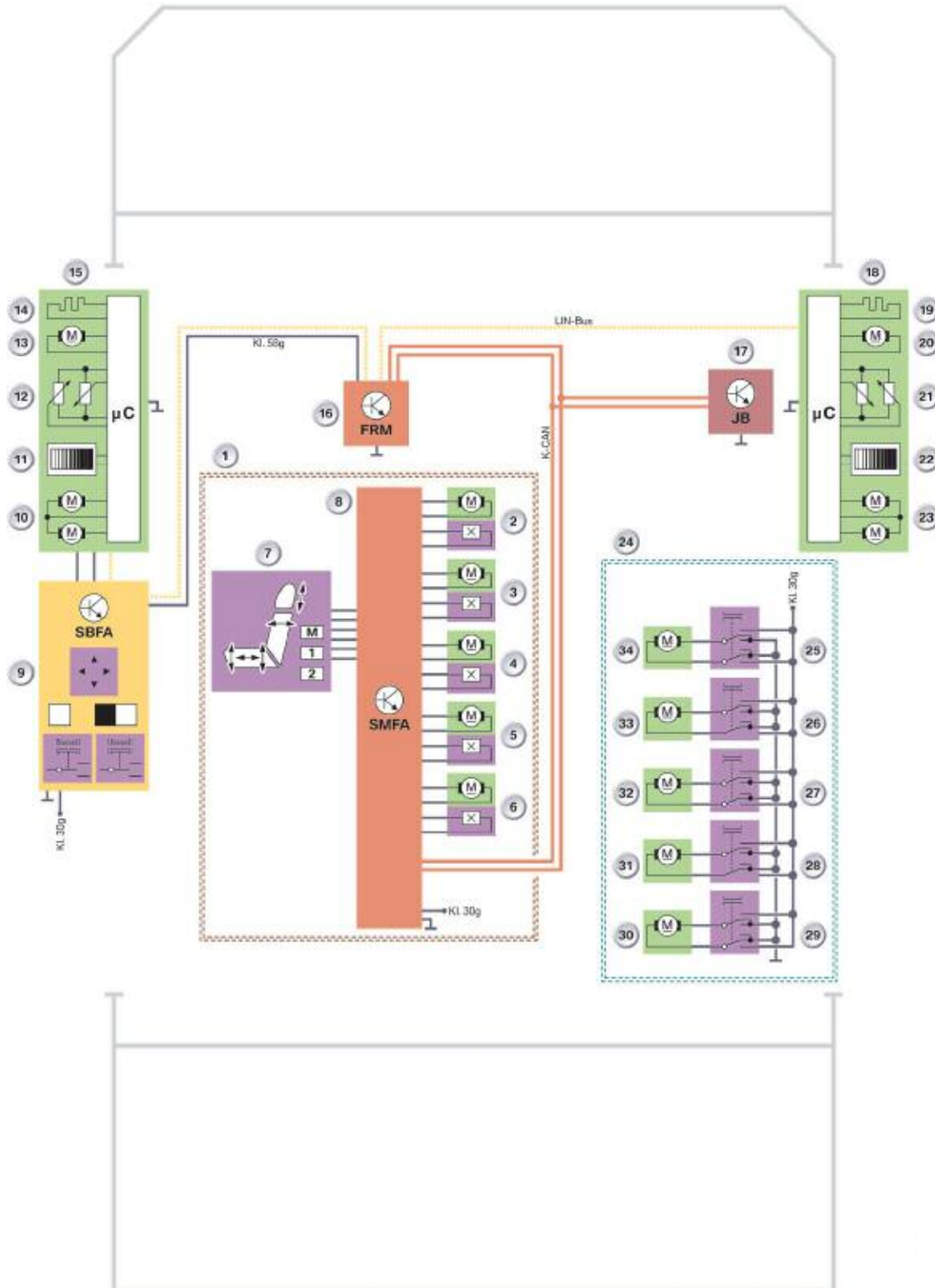
This row of seats is referred to as third row seating or 5 + 2 seat concept and are not equipped with seat heaters. However, an independent heating unit option is available just for the third row seats.

Third Row Seats



Basic/Sport Driver and Passenger Front Seats

Basic/Sport Driver and Passenger Front Seat w/ Memory function Circuit Diagram



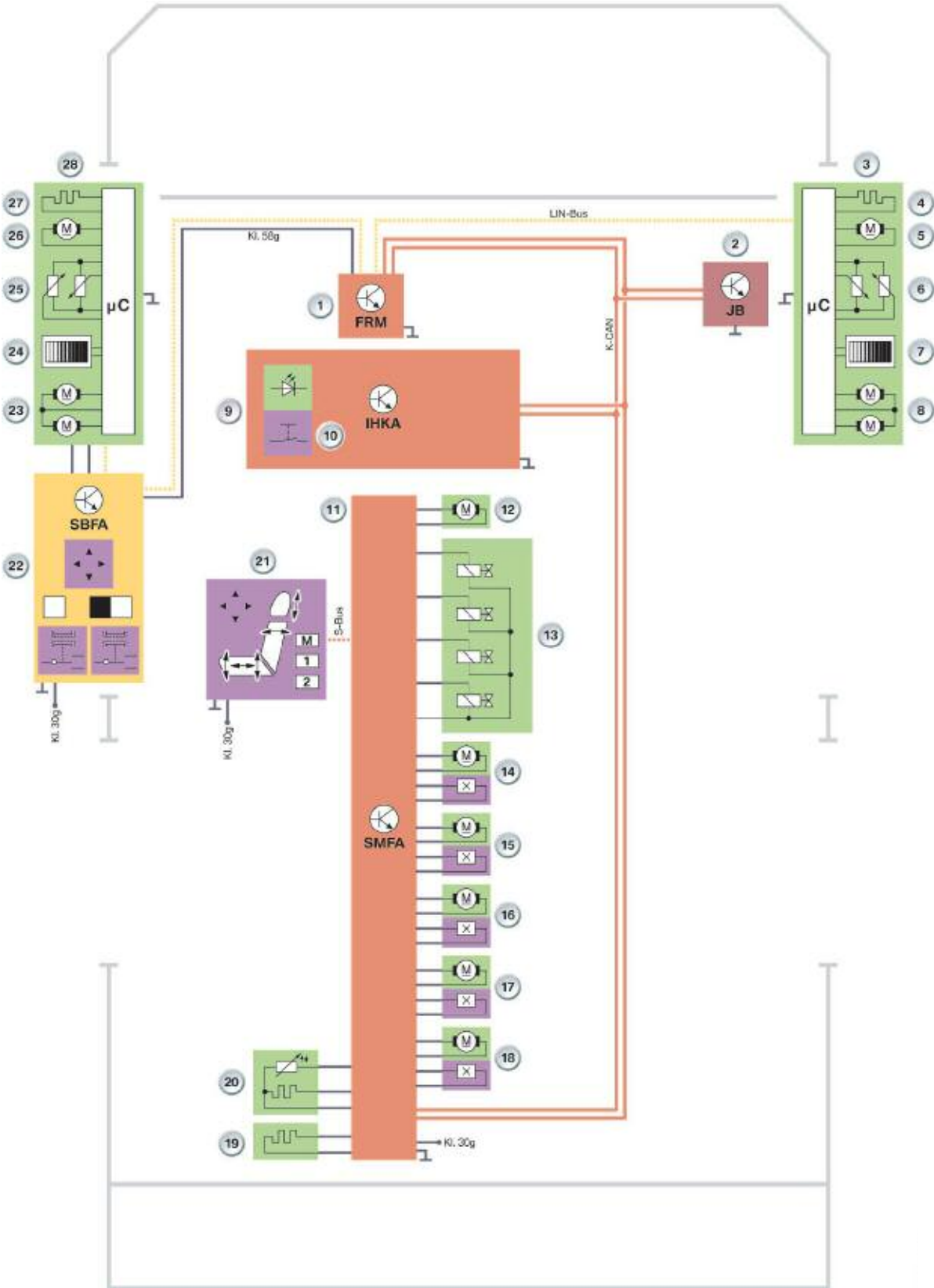
Basic/Sport Driver and Passenger Front Seat w/ Memory function Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Driver's seat	20	Motor for folding-mirror function, passenger side
2	Motor, seat-height adjustment	21	Potentiometer, memory position, front passenger side
3	Motor, longitudinal seat adjustment	22	Electrochromic door mirror, passenger side
4	Motor, seat-inclination adjustment	23	Adjustment motors, door mirror, front passenger side
5	Motor, backrest-inclination adjustment	24	Front passenger seat
6	Motor, head-restraint height adjustment	25	Seat-adjustment switch, seat height
7	Seat-adjustment switch with memory buttons	26	Seat-adjustment switch, seat length
8	Seat module, driver side	27	Seat-adjustment switch, seat inclination
9	Switch block, driver door (SBFA)	28	Seat-adjustment switch, backrest inclination
10	Adjustment motors, door mirror ,driver's side	29	Seat-adjustment switch, head restraint height
11	Electrochromic door mirror, driver side	30	Motor, head-rest height adjustment
12	Potentiometer, memory position, driver side	31	Motor, backrest-inclination adjustment
13	Motor for folding-mirror function, driver side	31	Motor, seat-inclination adjustment
14	Door-mirror heating, driver side	33	Motor, longitudinal seat adjustment
15	Door mirror, driver side	34	Motor, seat-height adjustment
16	Footwell module FRM	K-CAN	Body CAN
17	Junction-box ECU	KL 30g	Terminal 30g
18	Door mirror, front passenger side	KL 58g	Terminal 58g
19	Door-mirror heating, front passenger side	LIN-Bus	Local interconnect network bus

In the case of an electric driver seat (1) not fitted with a lumbar support, the seat adjustment switches (7) are read in directly by the seat module (8). The seat-adjustment switches are resistance-coded.

On an electric front passenger seat (24), the seat-adjustment switches (25 to 27) actuate the adjustment motors (30 to 34) directly.

Basic/Sport Driver Seat w/Heating, Memory and Lumbar Support Circuit Diagram



Basic/Sport, Driver Seat w/Heating, Memory and Lumbar Support Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Footwell module FRM	18	Motor, backrest-inclination adjustment
2	Junction-box ECU JB	19	Backrest heating
3	Door mirror, front passenger side	20	Seat-surface heating
4	Door-mirror heating, passenger side	21	Seat-adjustment switches, button for lumbar-support adjustment, memory buttons
5	Motor for folding-mirror function, passenger side	22	Switch block, driver door (SBFA)
6	Potentiometer, memory position, front passenger side	23	Adjustment motors, door mirror, driver side
7	Electrochromic door mirror, passenger side	24	Electrochromic door mirror, driver side
8	Adjustment motors, door mirror, front passenger side	25	Potentiometer, memory position, driver side
9	Integrated automatic heating/air conditioning IHKA	26	Motor for folding-mirror function, driver side
10	Seat-heating button	27	Door-mirror heating, driver side
11	Seat module, driver side	28	Door mirror, driver side
12	Pump for lumbar-support adjustment	K-CAN	Body CAN
13	Solenoid valves for lumbar-support adjustment	KL 30g	Terminal 30g
14	Motor, seat-height adjustment	KL 58g	Terminal 58g
15	Motor, longitudinal seat adjustment	S-Bus	Seat bus (K-bus protocol)
16	Motor, seat-inclination adjustment	LIN-Bus	Local interconnect network bus
17	Motor, backrest-inclination adjustment		

Note: This system circuit diagram features the driver side, basic and sport electric seat, with memory, heating and lumbar support functions. The seat bus is installed only from the lumbar support between the seat-adjustment switches (21) and the seat module (11). The system circuit diagrams for the driver and front passenger side are shown separately.

Driver Seat Adjustments

The electric basic seat or electric sport seat can be electrically adjusted in the following directions:

- Seat height
- Seat distance to steering wheel (longitudinal seat adjustment)
- Seat inclination
- Backrest inclination
- Head-rest height

The seats can be electrically adjusted from "Terminal 30g ON".



Index	Explanation	Index	Explanation
1	Lumbar-support adjustment	3	Seat-height adjustment
2	Seat-height adjustment	4	Memory buttons

A seat module activates the driver seat. The seat-adjustment switches signal the seat module the desired adjustment. The switches supply a defined voltage corresponding to the request. Based on these voltage values, the seat module determines which motor it must activate. Activation takes place via the relay in the seat module until the seat-adjustment switch is released or the end of the adjustment travel is reached.

The Hall sensors in the adjustment motors supply Hall pulses, which are evaluated by the seat module. The seat position is determined based on these Hall pulses.

This function is used not only to detect the end stops but also to store the memory position of the driver seat.

A locked up motor is detected by means of the current-measurement function integrated in the seat module. In this case, the relays are no longer actuated thus shutting down the motors.

The memory setting for this motor is inhibited until the motor is no longer locked.

Note: In the case of lumbar support seats, the seat-adjustment switches are no longer read directly by the seat module, as with the semi-electric basic seats. This means that the seat module is now connected with the S bus (K-bus protocol) to the seat-adjustment switches.

Driver Seat Heating

As on the semi-electric basic seat, the seat heating has two heating circuits. Each of the heating circuits has a heating area for the backrest and the seat cushion. The driver seat has the driver seat module (SMFA).

The function of the seat heating is integrated completely in the seat module. The driver seat module is connected to terminal 30g for the load current.

When the vehicle wakes up, the junction-box ECU determines whether a driver seat module is installed in the vehicle. The junction-box ECU sends a query via the K-CAN for this purpose. The driver seat module, which is connected via the K-CAN, responds via the K-CAN. The junction-box ECU now knows that a driver seat module is installed in the vehicle.

However, the seat heating can only be activated from the status "Terminal 15 ON". The status "Terminal 15 ON" is made available by the Car Access System 3 via the K-CAN.

The seat-heating button is located in the control panel for the integrated automatic heating/air conditioning. When the seat heating button is pressed, the integrated automatic heating/air conditioning sends the heating-stage request via the K-CAN.

The driver seat module evaluates the request for the desired heating stage actuates the seat heating accordingly. The driver seat module determines the set temperature by means of the NTC resistor in the heating mat of the seat surface. A fault in the seat-heating system results in a corresponding entry in the fault memory of the driver seat module.

Seat Heating Power Reduction

The junction-box ECU makes the information for power reduction available on the K-CAN. The driver seat module receives the information via the K-CAN. The driver seat module reduces the heat output in accordance with the request.

The Power Reduction Stages Are:

- Operation of seat heating in Stage 2 only
- Operation of seat heating in Stage 2 at only 50%
- Seat heating OFF

Note: In the event of a power reduction, the LEDs of the seat-heating switch are not switched off.

Driver Seat Lumbar Support

The button for lumbar-support adjustment is located on the front of the seat (facing the door). If the vehicle has lumbar support, the front passenger seat receives a seat module. The function of the lumbar support is integrated completely in the seat module.

The seat module evaluates the button for lumbar-support adjustment. Lumbar support is provided by two inflatable air cushions in the backrest. Each air cushion is inflated or deflated via two solenoid valves.

The pump for lumbar-support adjustment delivers the required air pressure. The pump and the solenoid valves are actuated by the seat module until the required lumbar support is established.

Note: In the case of seats with lumbar support, the buttons for seat adjustment are connected via the S-bus seat bus (K-bus protocol) to the seat module. This also applies to seats with a memory function.

Driver Seat Memory Function

The memory function on the basic or sport electric seat is only available for the driver seat. The memory buttons are located on the side of the driver seat. The memory function can be activated as from "Terminal R ON". Two memory positions and the current seat position can be stored.

By pressing the memory button "M" followed by pressing button "1" or "2", the current position of the driver seat is assigned to the pressed button.

At the same time, the current position of the door mirrors is also assigned to the selected button. The information for storing the door mirror position is sent by the driver seat module via the K-CAN.

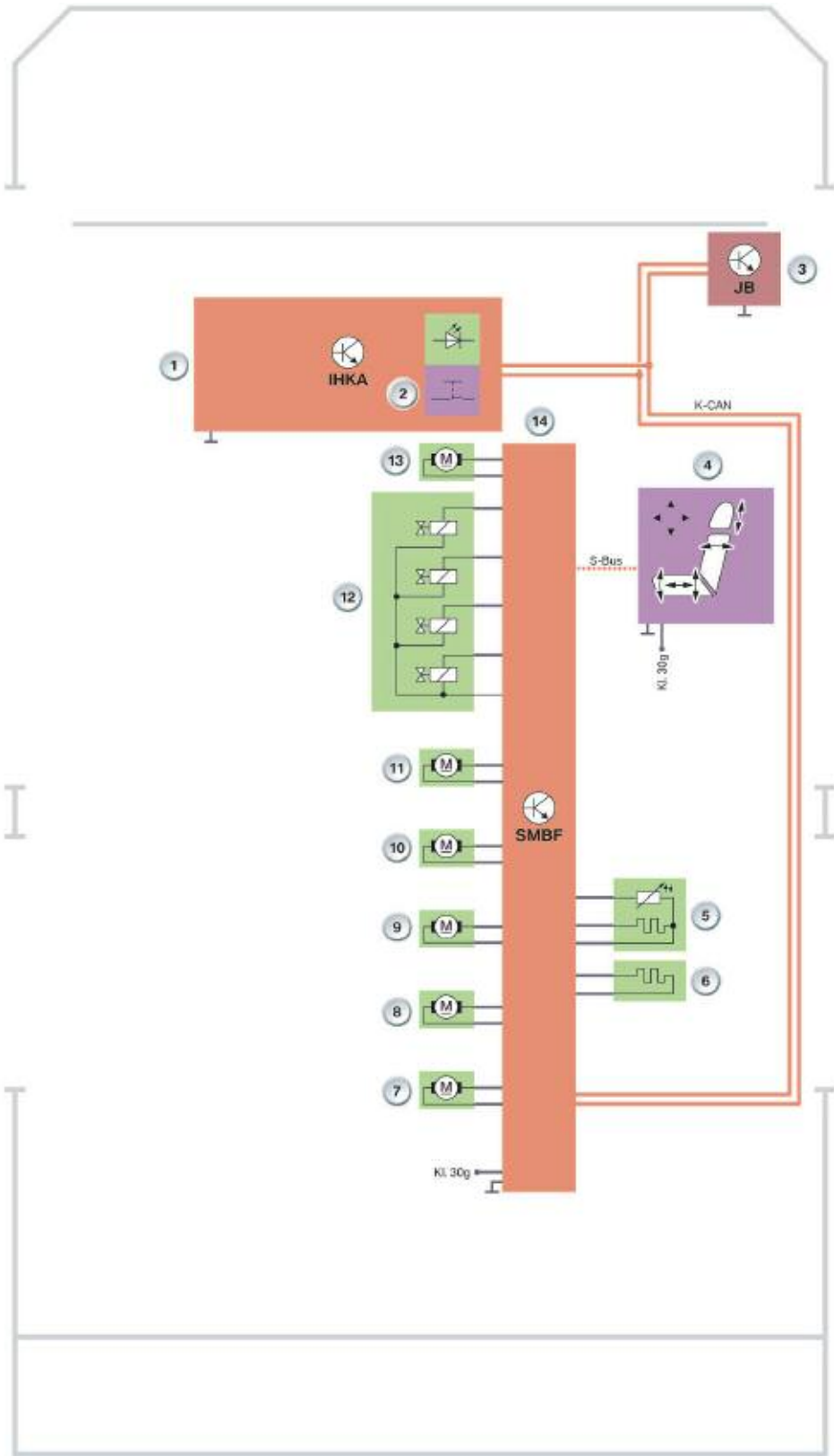
Note: The memory position of the door mirrors is stored in the footwell module.

Within the framework of Personal Profile, the data is assigned to the current remote control key when the memory position is stored.

NOTES

PAGE

Basic/Sport Front Passenger Seat w/Heating and Lumbar Support Circuit Diagram



Basic/Sport Front Passenger Seat w/Heating and Lumbar Support Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Integrated automatic heating/air conditioning IHKA	10	Motor, longitudinal seat adjustment
2	Seat-heating button	11	Motor, seat-height adjustment
3	Junction-box ECU (JB)	12	Solenoid valves for lumbar-support adjustment
4	Seat-adjustment switches, button for lumbar-support adjustment, memory buttons	13	Pump for lumbar-support adjustment
5	Seat-surface heating	14	Driver's seat module (SMBF)
6	Backrest heating	K-CAN	Body CAN
7	Motor, head-restraint height adjustment	KL 30g	Terminal 30g
8	Motor, backrest-inclination adjustment	S-Bus	Seat bus (K-bus protocol)
9	Motor, seat-inclination adjustment		

This circuit diagram features basic and sport, front passenger side seat, with seat heating and lumbar support.

The seat bus is installed only from the lumbar support between the seat-adjustment switches (5) and the seat module (15). In the case of seats not equipped with lumbar support, the seat-adjustment switches signal the seat module directly. The seat adjustment switches are resistance-coded.

Front Passenger Seat Adjustment

The basic and sport seat can be electrically adjusted in the following directions:

- Seat height
- Seat distance to steering wheel (longitudinal seat adjustment)
- Seat inclination
- Backrest inclination
- Head-rest height

The seats can be electrically adjusted from "Terminal 30g ON".

The front passenger side has a seat adjustment switch, from which the motors are directly activated. Activation takes place until the seat-adjustment switch is released or the end of the adjustment travel is reached.

The position of the front passenger seat is not stored and cannot be called up via Personal Profile.



Index	Explanation	Index	Explanation
1	Seat-backrest and head-restraint height adjustment	2	Longitudinal seat, seat-height and seat-inclination adjust

The seat-adjustment switches are connected directly to the power supply. Thus the seat-adjustment switches actuate the adjustment motors directly.

The switches for the backrest and head rest can be moved in four directions. The switch for the seat position can be moved in the following directions:

- Seat forward or back, longitudinal seat adjustment
- Seat high or low, seat-height adjustment
- Seat inclination up or down (turn seat adjustment switch)

Front Passenger Seat Heating

As on the semi-electric basic seat, the front passenger seat heating has two heating circuits. Each of the heating circuits has a heating area for the backrest and the seat cushion. However, the front passenger seat has a seat-heating seat module.

Front Passenger Seat Lumbar Support

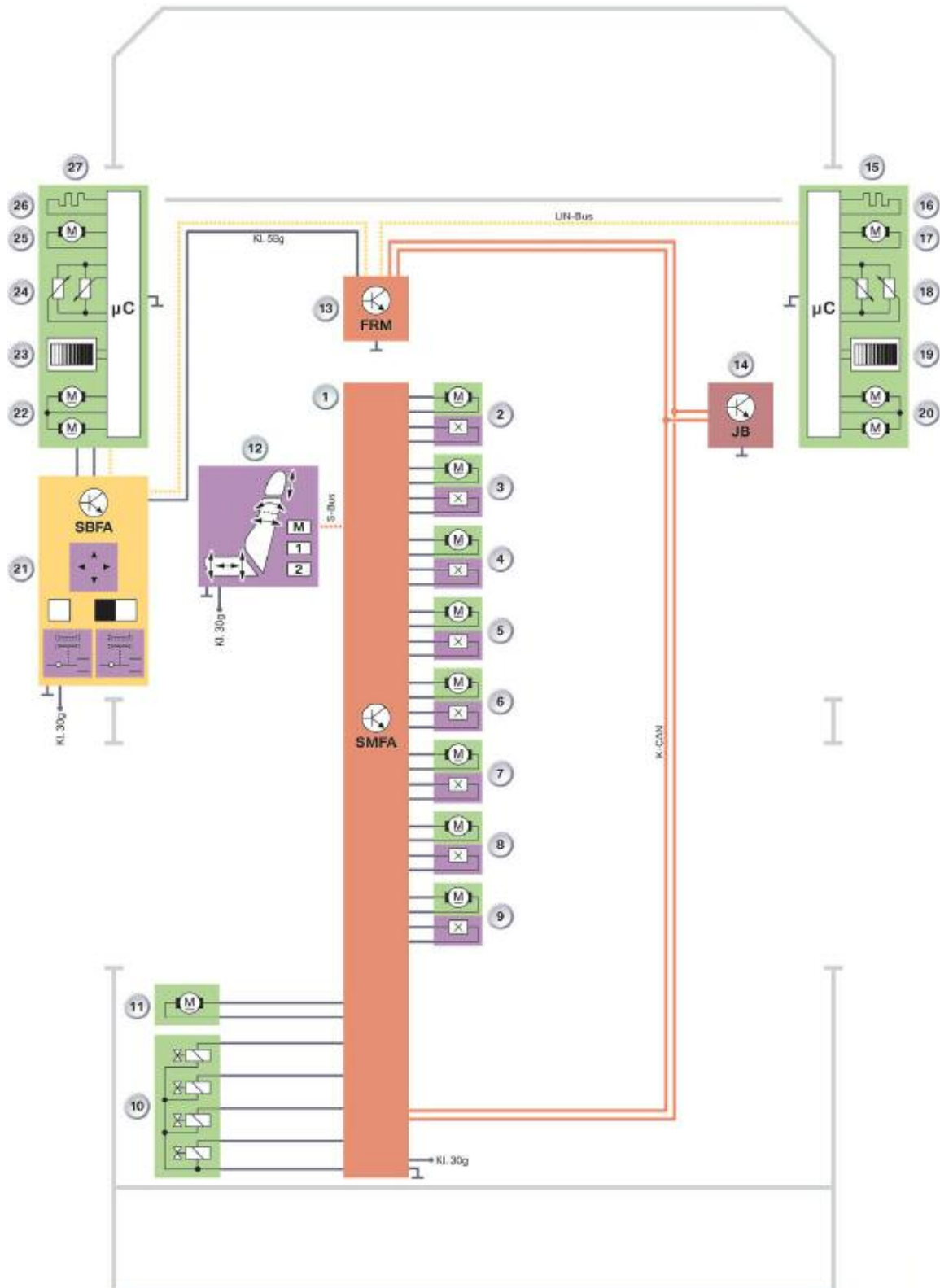
If the front passenger seat features lumbar adjustment, it requires a seat module. The complete function is integrated in the seat module. The signals from the seat-adjustment switches and from the button for lumbar support adjustment are interpreted by the seat module. The function is described in the section dealing with the basic and sport electric seat (driver's side).

Front Passenger Seat Memory Function

If the front passenger seat is equipped with a memory function, it requires a seat module. The signals from the seat-adjustment switches and from the button for lumbar support adjustment are received by the seat module via the S bus. The memory positions are stored in the front passenger seat module.

Multifunction Driver and Passenger Seats

Multifunction Driver Seat, Circuit Diagram



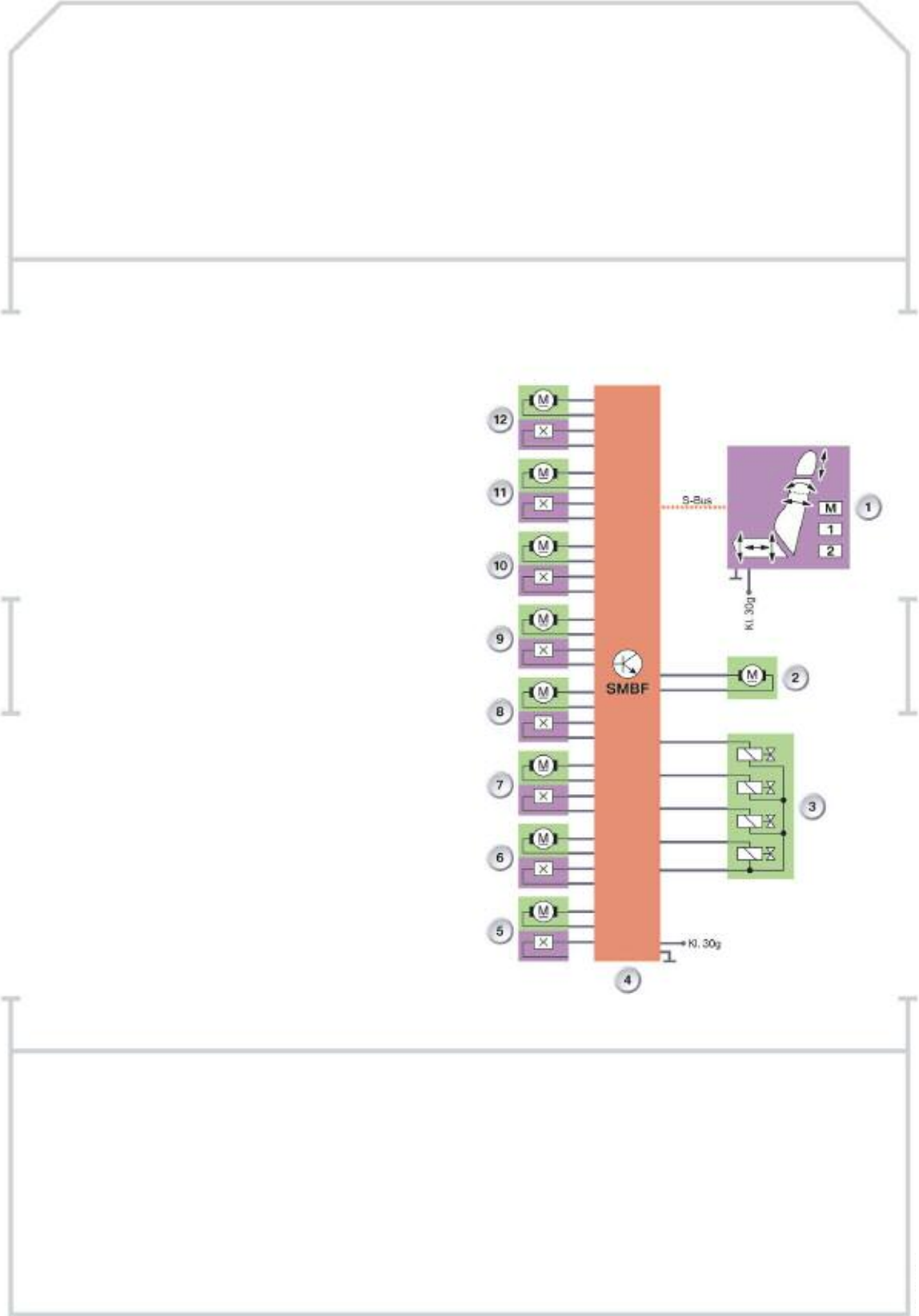
Multifunction Driver Seat Diagram Legend

Index	Explanation	Index	Explanation
1	Driver's seat module (SMFA)	17	Motor for folding-mirror function, door mirror, front passenger side
2	Motor, seat-height adjustment	18	Potentiometer for door-mirror position memory, passenger side
3	Motor, longitudinal seat adjustment	19	Electrochromic door mirror, passenger side
4	Motor, seat-inclination adjustment	20	Adjustment motors, door mirror, front passenger side
5	Motor, backrest-inclination adjustment	21	Switch block, driver side (SBFA)
6	Motor, backrest-head adjustment	22	Adjustment motors, door mirror, driver side
7	Motor, head-restraint height adjustment	23	Electrochromic door mirror, driver side
8	Motor, seat-depth adjustment	24	Potentiometer for door mirror position memory, driver side
9	Motor, backrest-width adjustment	25	Motor for folding-mirror function, door mirror, driver side
10	Solenoid valves for lumbar-support adjustment	26	Door-mirror heating, driver side
11	Pump for lumbar-support adjustment	27	Door mirror, driver side
12	Control buttons, seat adjustment	K-CAN	Body CAN
13	Footwell module FRM	KL 30g	Terminal 30 switched
14	Junction-box ECU (JB)	KL 58g	Terminal 58 switched
15	Door mirror, front passenger side	S-Bus	Seat bus (K-bus protocol)
16	Door-mirror heating, passenger side	LIN-Bus	Local interconnect network bus

The multifunction seat can be ordered with the following options:

- Seat heating
- Active seat
- Active seat ventilation

Multifunction Front Passenger Seat Circuit Diagram



Multifunction Front Passenger Seat Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Control buttons, seat adjustment	8	Motor, backrest-head adjustment
2	Pump for lumbar-support adjustment	9	Motor, backrest-inclination adjustment
3	Solenoid valves for lumbar-support adjustment	10	Motor, seat-inclination adjustment
4	Driver's seat module (SMFA)	11	Motor, longitudinal seat adjustment
5	Motor, backrest-width adjustment	12	Motor, seat-height adjustment
6	Motor, seat-depth adjustment	KL 30g	Terminal 30g
7	Motor, head-rest height adjustment	S-Bus	Seat bus (K-bus protocol)

The multifunction seat can be ordered with the following options:

- Seat heating
- Active seat (European vehicles only)
- Active seat ventilation

Note: In US vehicles the front passenger seat has seat-occupancy recognition. For this reason, a US version of the active seat cannot be offered for the front passenger side.

Seat Adjustments

The multifunction seat option contains the memory function for the driver and front passenger seats. Multifunction seats can be electrically adjusted in the following directions:

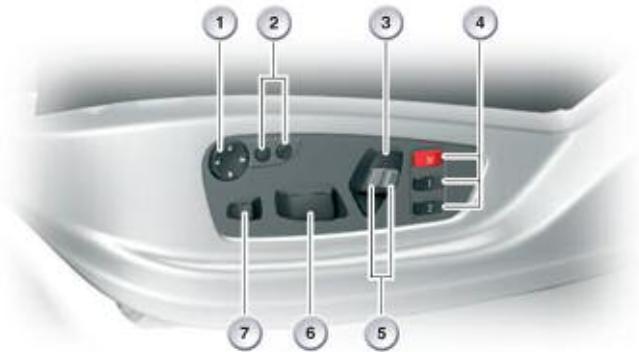
- Seat height
- Seat distance to steering wheel (longitudinal seat adjustment)
- Seat inclination
- Backrest inclination
- Head rest height
- Backrest-head inclination
- Seat depth
- Backrest width

Each multifunction seat has a seat module. All the seat-adjustment buttons are evaluated by the seat module.

The buttons are connected via the S bus (seat bus on the basis of the K-bus protocol) to the seat module.

The seat module is responsible for the seat functions. It controls and monitors the function sequences. Seat adjustment is possible as from "Terminal 30g ON". When the seat adjustment switches are operated, the seat module operates the motors to move the seat in the desired direction. The seat is moved by the motors until such the seat-adjustment switch is released or the seat reaches its adjustment limit.

The seat positions are stored in the seat module. The seat module receives the signal from the backrest-width button via the S bus. After it has been operated, the backrest-width switch always returns to its initial position. It is integrated in the side panel of the seat.



Index	Explanation	Index	Explanation
1	Button for lumbar-support adjustment	5	Articulating backrest adjustment
2	Backrest-width adjustment button	6	Longitudinal seat, seat-height and seat-inclination adjustment
3	Backrest- inclination and headrest height adjustment	7	Seat-depth adjustment
4	Memory function		

Seat Heating

The seat heating for the multifunction seat has four heating circuits. Each comprises one quick heating area and one residual heating area for backrest and seat cushion. Each heating area is provided with a temperature sensor. A maximum of two heating circuits are switched on simultaneously.

The seat heating function is integrated completely in the seat module. The seat module is connected to terminal 30g for the load current.

When the vehicle wakes up, the junction-box ECU determines which seat module is installed in the vehicle. The junction-box ECU sends a query via the K-CAN for this purpose.

The driver and front passenger seat modules respond via the K-CAN. The junction-box ECU must register a response within 200 ms. The junction-box ECU now knows that a driver seat module or a front passenger seat module is installed in the vehicle.

However, the seat heating can only be activated from the status "Terminal 15 ON". The status "Terminal 15 ON" is made available by the Car Access System 3 via the K-CAN.

The seat-heating button is located in the control panel for the integrated automatic heating/air conditioning (IHKA). When the seat heating button is pressed, the IHKA sends the heating-stage request via the K-CAN.

The driver seat module evaluates the request for the desired heating stage and operates the seat heating accordingly. The driver seat module determines the set temperature by means of the NTC resistor in the heating mat of the seat surface. A fault in the seat-heating system results in a corresponding entry in the fault memory of the driver seat module.



Index	Explanation
1	Seat-heating button, driver seat
2	Seat-heating button, front passenger seat

Quick Heating Area

When the seat heating is switched on, the quick heating areas are activated first in order to warm the seats up quickly.

After the initial quick warm-up, the residual heating areas are switched on in order to ensure uniform temperature distribution in the seat.

Activation of all the heating areas is clocked so that a defined current intensity is not exceeded during residual heating. The duty cycle is dependent on the selected heating stage, the switch-on period and the heating area temperature.

Seat Heating Power Reduction

The junction-box ECU makes the information for power reduction available on the K-CAN. The driver seat module and front passenger seat module receive the information via the K-CAN. The seat modules reduce the heat output in response to the request. The reduction stages were described in a previous section.

Lumbar Support Function

The lumbar support function is integrated completely in the seat module. The seat module evaluates the button for lumbar support adjustment.

Lumbar support is provided by two inflatable air cushions in the backrest. Each air cushion is inflated or deflated via two solenoid valves.

The pump and the solenoid valves for lumbar-support adjustment are actuated by the seat module until the required lumbar support is established to the desired level of comfort .

Seat Memory Function

The memory function on the multifunction seat is available for the driver and front passenger seats only. The memory buttons are located on the sides of the seats.

The memory function can be activated as from the status "Terminal R ON". Two memory positions and the current seat position can be stored by pressing the memory button "M" followed by pressing button "1" or "2", thus current position of the seat is assigned to the button.

At the same time, the current position of the door mirrors is also assigned to the selected button. The information for storing the door mirror position is sent by the driver seat module via the K-CAN.

Note: The memory position of the door mirrors is stored in the footwell module.

Within the framework of Personal Profile, the data is assigned to the current remote control key when the memory position is stored.

The full equipment specification of the multifunction seat contains the following options:

- Active seat (US version)
- Active seat ventilation

The functions of the front passenger seats are identical to those of the driver seat. However, the front passenger seat does not contain the door-mirror memory function.

Note: The US version of the front passenger seat has seat-occupancy recognition. For this reason, a US version of the active seat cannot be offered for the front passenger seat.

Active Seat

The active seat is switched on by the button in the center-console switch center. The function operates when "Terminal 15 ON".

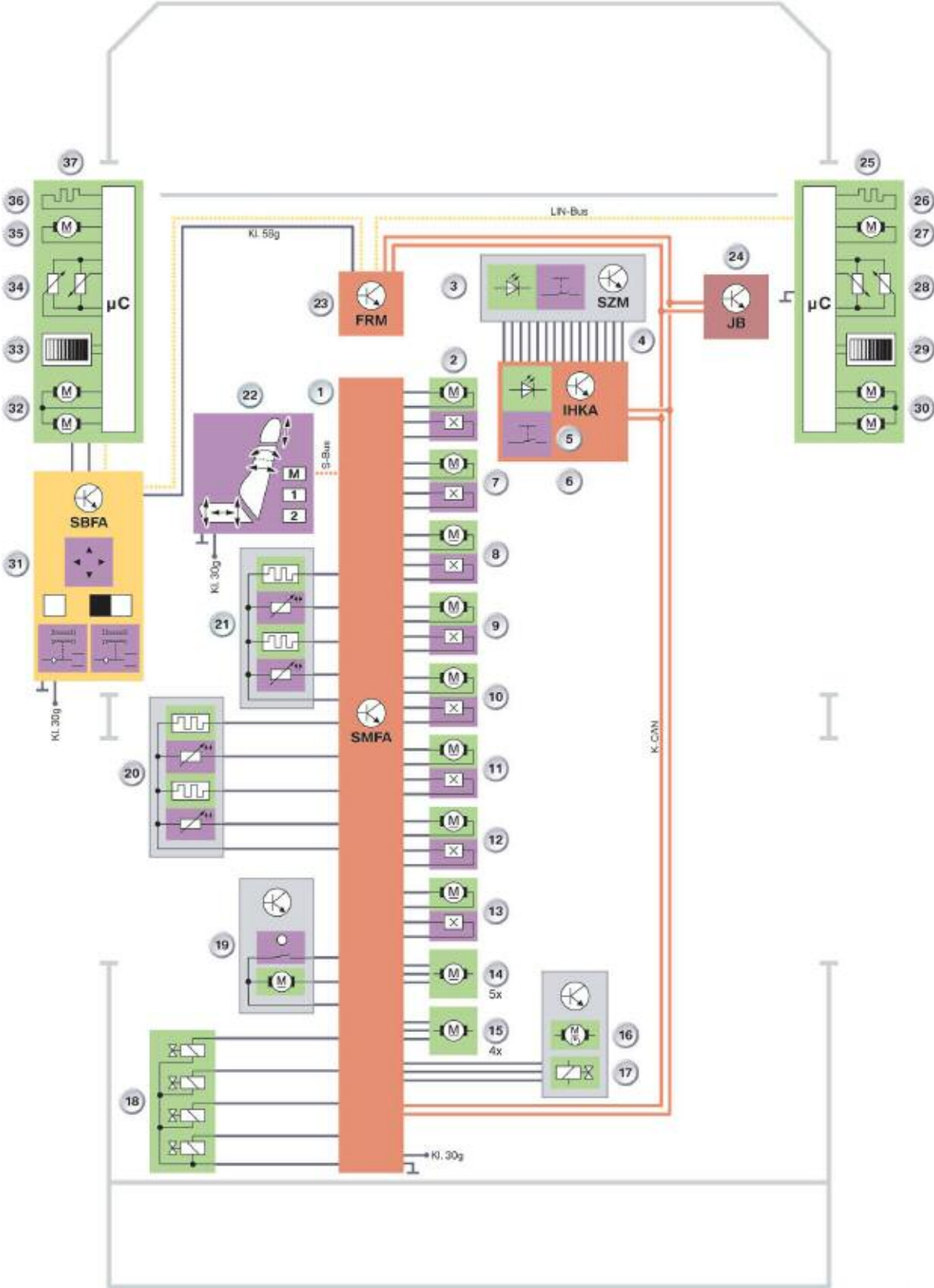
The integrated automatic heating/air conditioning receives the signal from the center-console switch center and sends it via the K-CAN. The seat module thus receives the request and executes it.

This function is derived from the E60. However, the active seat has a pneumatic system. The system uses the pump for lumbar-support adjustment to deliver the required amount of air into the seat cushion.

Note: Lumbar-support adjustment has priority over the Active Seat. The pump runs at maximum speed for the active-seat function and the pump for lumbar support adjustment runs at roughly half that speed.

Note: Lumbar-support adjustment has priority over the active seat. For Lumbar Support adjustment, the pump runs at maximum speed. For the active-seat function, the pump for lumbar support adjustment runs at roughly half this speed

Multifunction Seat w/Active Seat and Active Seat Ventilation Circuit Diagram



Multifunction Seat w/Active Seat and Active Seat Ventilation Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Driver's seat module (SMFA)	22	Control buttons, seat adjustment
2	Motor, seat-height adjustment	23	Footwell module FRM
3	Active-seat button	24	Junction-box ECU (JB)
4	Center-console switch center SZM	25	Door mirror, front passenger side
5	Button, seat heating and active seat ventilation	26	Door-mirror heating, passenger side
6	Integrated automatic heating/air conditioning IHKA	27	Motor for folding-mirror function, door mirror, front passenger side
7	Motor, longitudinal seat adjustment	28	Potentiometer for door-mirror position memory, passenger side
8	Motor, seat-inclination adjustment	29	Electrochromic door mirror, passenger side
9	Motor, backrest-inclination adjustment	30	Adjustment motors, door mirror, front passenger side
10	Motor, backrest-head adjustment	31	Switch block, driver side (SBFA)
11	Motor, head-restraint height adjustment	32	Adjustment motors, door mirror, driver side
12	Motor, seat-depth adjustment	33	Electrochromic door mirror, driver side
13	Motor, backrest-width adjustment	34	Potentiometer for door-mirror position memory, driver side
14	Motors, active seat ventilation, seat surface	35	Motor for folding-mirror function, door mirror, driver side
15	Motors, active seat ventilation, backrest surface	36	Door-mirror heating, driver side
16	Pump for lumbar-support adjustment/active seat	37	Door mirror, driver side
17	Solenoid valve, changeover, lumbar-support adjustment/active seat	K-CAN	Body CAN
18	Solenoid valve, lumbar-support adjustment	KL 30g	Terminal 30g
19	Distributor module, active seat	KL 58g	Terminal 58g
20	Seat-surface heating	S-Bus	Seat bus (K-bus protocol)
21	Backrest heating	LIN-Bus	Local interconnect network bus

Four air cushions are integrated in the seat surface for the active seat. Two air cushions, one on top of the other, are used in both the left and right seat halves.

The air cushions are inflated with air provided by the pump for lumbar-support adjustment. A solenoid valve is integrated in the pump unit. The function of the solenoid valve is to change over the air supply. This ensures that only one function (lumbar-support adjustment or active seat) is ever executed.

A distributor module is used for inflating the air cushions. The seat module delivers power to the distributor module as soon as the active seat is switched on.

The distributor module houses a motor, which drives an eccentric shaft. The rotation of the eccentric shaft causes the air inlets to the seat cushions to open or close.

The seat cushions are alternately inflated or deflated, depending on the position of the eccentric shaft. The air inlets are closed when the system is switched off and in the breaks between inflation or deflation.

A switch contact is integrated in the distributor module to switch on the pump for lumbar support adjustment. The rotation of the eccentric shaft actuates the contact, which thereby signals activation to the seat module. The seat module switches on the pump for lumbar-support adjustment and changes the solenoid valve to inflate the seat cushions.

Low Voltage

If the function fails due to low voltage when the active seat is switched on, the active seat must be calibrated. The function does this by itself. The seat cushions are completely deflated the next time the active seat is switched on. The active seat function is then ready for operation again.

In the event of a fault, the system shuts down or stop in the next center position in order to avoid further damage. In the interest of avoiding irritation when cornering at high speed, the active-seat function is stopped immediately in the event of excessive lateral acceleration.

The lateral-acceleration signal comes from the yaw-rate sensor. Dynamic Stability Control evaluates the signals from the yaw-rate sensor and sends them via the PT-CAN.

The junction-box ECU makes the signals available on the K-CAN. In this way, the seat module receives the signal for the vehicle's lateral acceleration. Activation of the active seat is reversed by the seat module from a defined threshold. The active seat is switched on again when the lateral-acceleration value drops again.

Active Seat Ventilation

The active seat ventilation option allows the occupants to cool the seat surfaces and backrest individually.

Active seat ventilation is available for both driver and front passenger seats. Active seat ventilation can be activated as from the status "Terminal 15 ON".

Stage 3 is engaged when the button is pressed for the first time. This means a high fan stage for seat and backrest. By pressing the button a second and third time lower stages of cooling are achieved. By pressing the button a even further will shut OFF the system. Active seat ventilation is deactivated if the button remains pressed for longer than 1.2



Index	Explanation	Index	Explanation
1	Seat-heating button, driver seat	3	Button, active seat ventilation, front passenger seat
2	Button, active seat ventilation, driver's seat	4	Seat-heating button, front passenger seat

Pressing the button results in a menu being brought up in the Central Information Display. The individual air-conditioning stages can be selected from this menu, for example when the button is pressed again. An LED on the button indicates when active seat ventilation is switched on.

The integrated automatic heating/air conditioning evaluates the signals for operating active seat ventilation. The request is sent via the K-CAN. The seat module thus receives the request and executes it. The seat module activates and monitors the fans.

Nine fans are accommodated in each seat. The fans are switched on by the seat module and activated separately for backrest and seat surface. For active ventilation, the seat has two speed stages for the fans, depending on the air-conditioning stage. The seat surface has five fans, while the backrest has four fans.

After having been activated for a period in excess of 15 minutes, active seat ventilation is automatically switched back from Stage 3 to Stage 2.

The function of activated seat ventilation remains stored for up to 15 minutes after the status "Terminal 15 OFF". Active seat ventilation is switched on again if in this time the status "Terminal 15 ON" is received by the seat module.

The energy management system in the vehicle can deactivate active seat ventilation briefly depending on the vehicle's energy balance. The function indicator is retained however.

Fan Stages:

A/C stage	Fans, seat	Fans, backrest
3	High	High
2	High	Low
1	Low	Low
0	OFF	OFF



Second Row Seats (Rear Seat)

The Seat heating option is also available for second row seats. Seat heating is an option. The seat heating option cannot be ordered individually. This means that it can only be ordered in conjunction with the Front Seat-heating option.

Seat heating for the second row is available in two equipment specifications:

- Rear Seat heating without automatic rear-cabin air conditioning
- Rear Seat heating with automatic rear-cabin air conditioning

Rear Seat Heating w/out Automatic Rear-cabin Air Conditioning

The seat heating features two heating circuits each in the right and left seat halves. Each of the heating circuits has a heating area for the backrest and the seat cushion.

The seat heating is connected to the "Terminal 15" relay. The seat heating can therefore only be activated from "Terminal 15 ON". The seat heating can be switched on individually for the left or right seat half with buttons.

The seat-heating buttons are integrated under the air vents in the rear center console.



Index	Explanation	Index	Explanation
1	Seat-heating button, driver's side, rear	2	Seat-heating button, front passenger side, rear

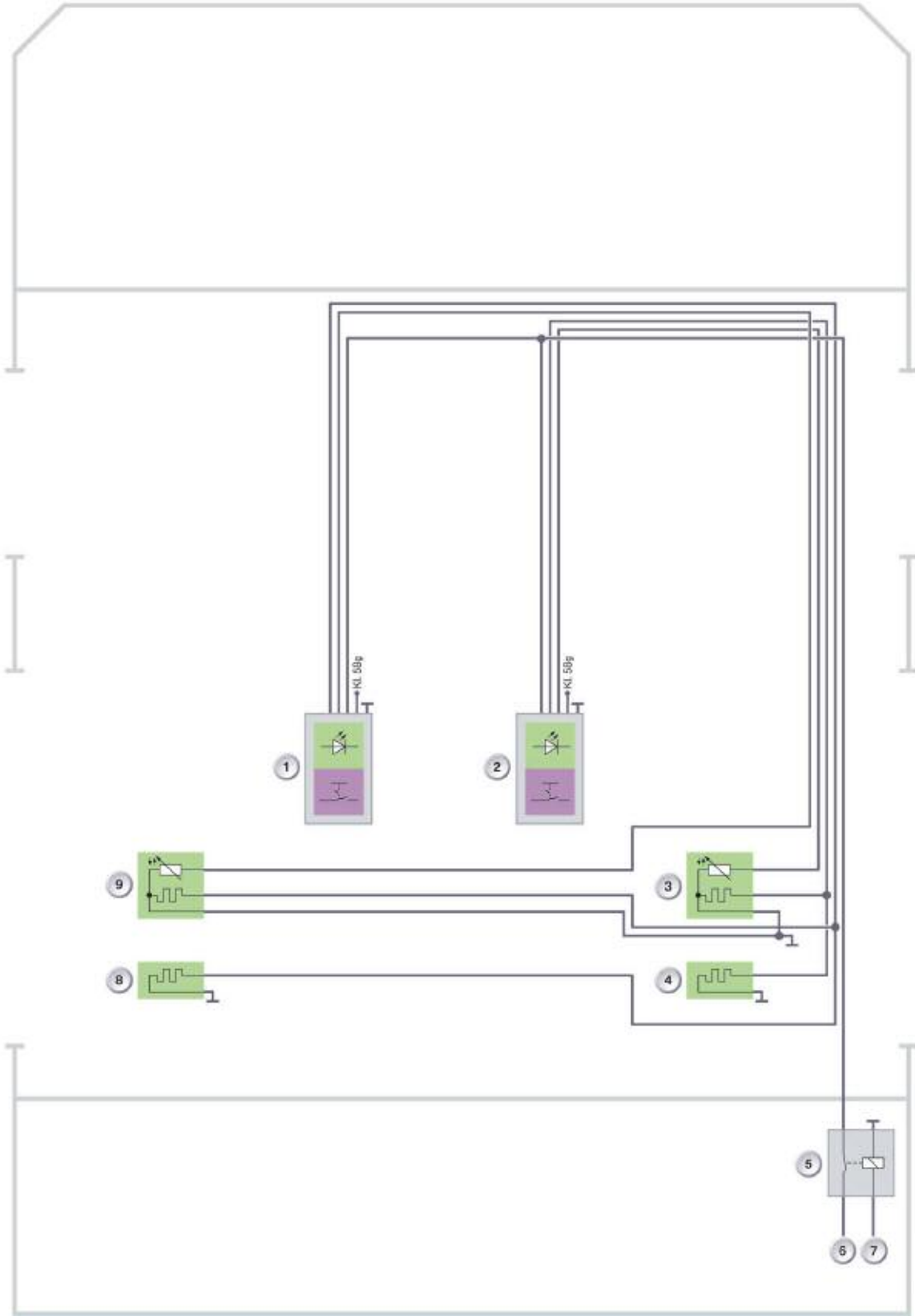
The seat heating can be switched on in two heating stages. The heating stages and their indications are set out in the following table. The seat heating is controlled by means of an NTC resistor in the heating mat of the seat surface. The buttons are resistance-coded and make a different supply voltage available for the seat heating.

Heating stage	Seat	Backrest	LED
2	Normal	Normal	2
1	Low	Low	1
0	OFF	OFF	OFF

NOTES

PAGE

Rear Seat Heating w/out Automatic Rear-cabin Air Conditioning Circuit Diagram



Rear Seat Heating w/out Automatic Rear-cabin Air Conditioning Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Seat-heating button, driver side, with function indicator	6	Terminal 30 (distribution box, front)
2	Seat-heating button, front passenger side, with function indicator	7	Terminal 15 ON (switched by CAS3)
3	Seat heating, seat surface, front passenger side	8	Seat heating, backrest, driver side
4	Seat heating, backrest, front passenger side	9	Seat heating, seat surface, driver side
5	Relay, terminal 15	KL 58g	Terminal 58 switched

Note: The Car Access System 3 actuates a relay in the front distribution box. The front distribution box is thus supplied with "Terminal 15 ON" (7). The Terminal 15 relay (5) among others is connected to this supply.

Rear Seat Heating w/Automatic Rear-cabin Air Conditioning

The seat heating has two heating circuits, as described above. It does, however, have a seat-heating seat module.

The function of the seat heating is integrated completely in the seat-heating seat module. The seat-heating seat module is connected to terminal 30 for the load current.

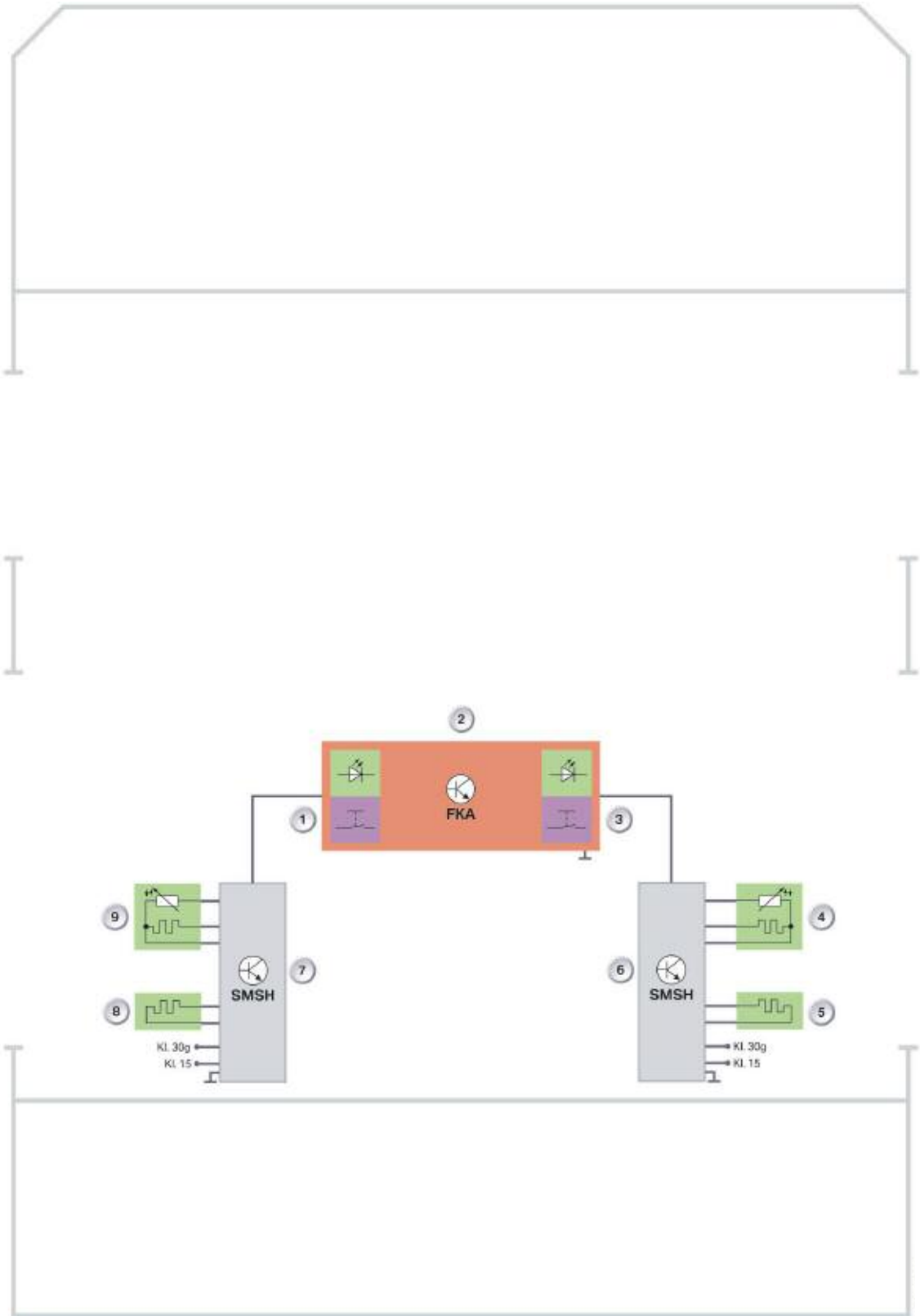
The seat heating can be activated from the status "Terminal 15 ON". Automatic rear cabin air conditioning receives the status "Terminal 15 ON" via the K-CAN.

The buttons for operating the seat heating are integrated in the control panel for automatic rear-cabin air conditioning. The automatic rear-cabin air conditioning ECU evaluates the buttons and activates the seat heating depending on the selected heating stage.

The seat-heating seat module is supplied with a pulse-width-modulated signal for this purpose. The pulse width corresponds to the required heating stage.

The seat-heating seat module executes the request and monitors the seat heating. The seat-heating seat module determines the set temperature by means of an NTC resistor in the heating mat of the seat surface.

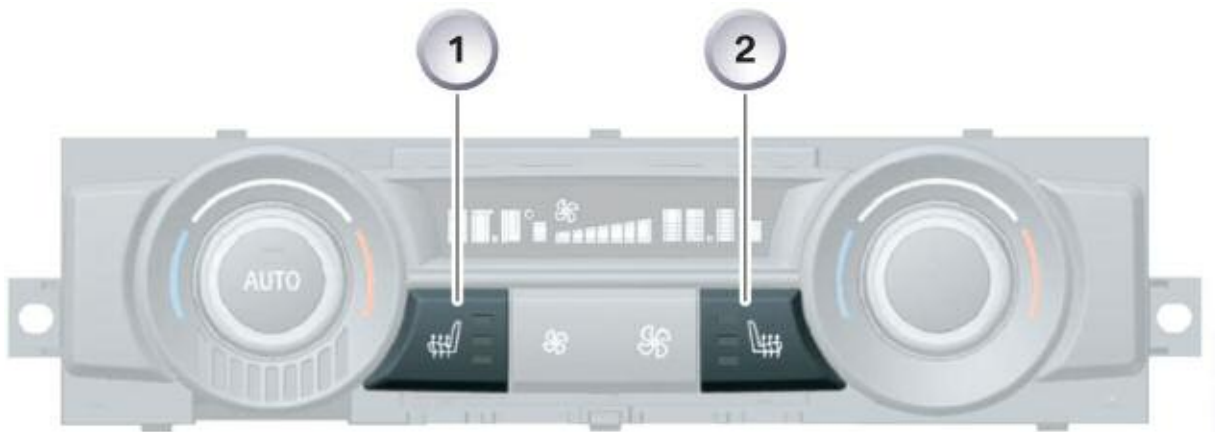
Rear Seat Heating w/Automatic Rear-cabin Air Conditioning Circuit Diagram



Rear Seat Heating w/Automatic Rear-cabin Air Conditioning Circuit Diagram Legend

Index	Explanation	Index	Explanation
1	Seat-heating button, driver side, with function indicator, rear	7	Seat-heating seat module, driver side, rear
2	Automatic rear-cabin air conditioning	8	Seat heating, backrest, driver side
3	Seat-heating button, front passenger side, with function indicator, rear	9	Seat heating, seat surface, driver side
4	Seat heating, seat surface, front passenger side	KL 30g	Terminal 30 switched
5	Seat heating, backrest, front passenger side	KL 15	Terminal 15 (distribution box, front)
6	Seat-heating seat module, front passenger side, rear		

Seat Heating Buttons W/Rear IHKA.



Index	Explanation	Index	Explanation
1	Seat-heating button, driver side	2	Seat-heating button, front passenger side

The seat heating can be switched on in three heating stages. The heating stages and their indications are set out in the following table.

Heating stage	Seat	Backrest	LED
3	High	High	3
2	Normal	Normal	2
1	Low	Low	1
0	OFF	OFF	OFF

Second Row Seat Locking

The locking function of the seat bench in the second seat row is monitored. For example, a locked seat bench ensures that it cannot come loose during driving and result in passenger injuries.

The second row seats are divided into a large and a small seat sections. The ratio is 60-40. Therefore, the large seat portion has four Micro-switches while the small seat portion has one Micro-switch for monitoring the lock.

The junction-box ECU issues a signal as soon as the contact to the ground connection is interrupted. The signal alerts the customer that the second row is not locked correctly.

The Large Seat Section

Micro-switches are installed for the backrest and seat surface for monitoring the large seat section. On the backrest there is only one Micro-switch, on the outside.

There are two further Micro-switches in the seat bottom, on the inside and outside of the locks. Another Micro-switch is located on the seat-cushion arm in the seat bottom to detect when the backrest is in the fully set-down in position and locked.

All the switches are closed when the seat section is correctly locked. One of the switches of a locked seat is always open or closed. The following seat states are monitored:

- Large seat half, backrest, folded up and locked
- Large seat half, backrest, folded down
- Large seat half, seat surface tilted
- Large seat half, seat surface locked

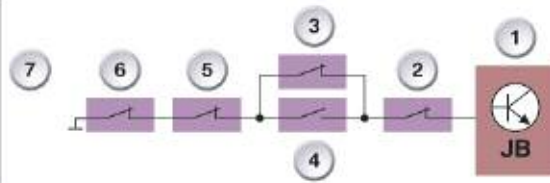
The Small Seat Section

The small seat section is monitored by a Micro-switch, since there is no belt integrated in the backrest. The Micro-switch is situated on the mechanical lock on the inside of the seat bottom. The switch is closed when this seat is correctly locked.

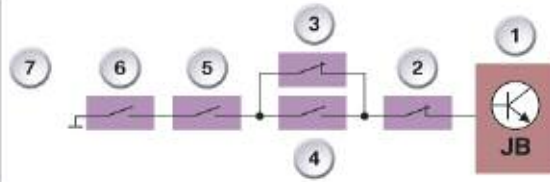
Index	Explanation
1	Micro-switch, seat (40 % seat, lock on seat bottom)
2	Micro-switch, large seat half (60% lock, seat, inner)
3	Micro-switch, large seat half (60% lock, outer)
4	Micro-switch, large seat half (60% backrest, outer)
5	Micro-switch, large seat half (60% seat-cushion arm, inner)



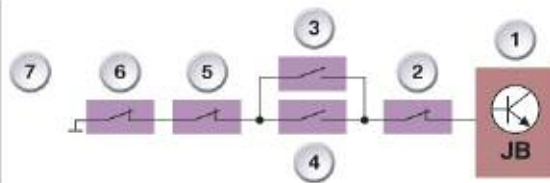
Seat Position/Backrest Position



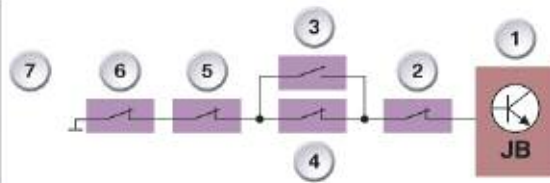
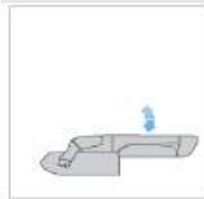
Seat position, second seat row completely locked



Large seat half, seat bench tilted (also called Easy Entry)



Large seat half, backrest, folded down, not locked



Large seat half, backrest, folded down

Index	Explanation	Index	Explanation
1	Junction-box ECU (JB)	5	Micro-switch, large seat half (backrest, outer)
2	Micro-switch, small seat half (40%)	6	Micro-switch, large seat half (seat cushion arm)
3 + 4	Micro-switches, large seat half (seat, inner/outer)	7	Seat position/backrest position

Junction-Box ECU

The junction-box ECU is the monitoring electronic control unit. In the event of an incorrectly locked seat, the junction-box ECU no longer has ground contact with this pin.

The signal level therefore changes from Low to High. The junction-box ECU issues a check control message and alerts the driver to an unlocked seat.

Third Row Seat

The seat concept described above can be extended by the 5+2 seat concept. This is available as the 5+2 seat-extension option. The additional two seats are situated in the luggage compartment and can be folded down completely. This seat row is the third row in the E70.

These seats are not equipped with seat heating. However, an independent heating option is available for the third row. More information can be found in the Product Information "E70 Heating / Air Conditioning".

Seat-position recognition, US version

The US version of the driver seat has seat position recognition. Seat-position recognition indicates where longitudinally the seat is situated (distance to the steering wheel). In this way, the distance between the driver and the steering wheel can be detected.

The ACSM requires this information so that it can fire the airbag under defined conditions. A more detailed description can be found in the Product Information "E70 Advanced Crash Safety Management".

Seat-position recognition is calibrated at the factory. The positions in the front and rear longitudinal seat direction are known to the seat module. A maximum distance is available for longitudinal seat adjustment.

This stretches from the mechanical front stop to the mechanical rear stop. The motor for adjustment in the longitudinal direction generates Hall pulses over this distance. The seat modules uses these Hall pulses to identify the current (absolute) seat position.

An area for example in which a person of short stature would sit is defined in the longitudinal direction. The absolute seat position can be lost due to specific causes. The seat must therefore be calibrated. Please refer to the Service Information.

Service Information

Calibration of US-Version Driver Seat

The position of the driver seat in the longitudinal direction can become implausible in the course of that seat's life. This can be caused by repeatedly moving the seat forward and back in the longitudinal direction.

These movements can give rise to an unauthorized position delta which no longer provides for a determination of the seat position.

The seat must therefore be recalibrated. Calibration is easy and can be performed by the customer him-/herself. Please refer to the Owner's Handbook.

Note: The seat must be moved in the mechanical front stop. Then the seat is calibrated and can be adjusted in the desired seat position.

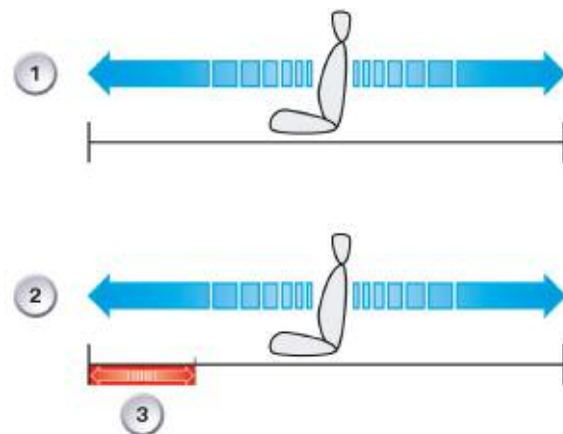
If the seat is unable to reach the mechanical front stop, the calibration must be performed in the service garage/workshop.

This situation can come about if, a coin is stuck in the seat-adjustment rail and blocks the adjustment travel.

When repairs are made to the seat, the seat must always be calibrated. This is necessary to guarantee seat-position recognition, or more precisely to increase the safe and reliable function of seat-position recognition.

Switching the seat ECU for test purposes for example with one from another vehicle is possible. The seat calibration will be lost however. Because the possibility of the calibration being in order when the old seat ECU is reinstalled cannot be ruled out, it is necessary to calibrate the seat. Refer to the repair instructions for seat calibration.




Index	Explanation
1	Relative seat position
2	Absolute seat position
3	5% woman area
Blue arrow	5% woman area
Red arrow	Seat-adjustment travel (5% woman)



Note: The ACSM receives from the seat ECU via the K-CAN a message once a second as to whether calibration of the seat is necessary.

As soon as the message contains the information "Calibrating necessary", the ACSM outputs a check control message via the K-CAN to the instrument cluster.

The seat ECU can likewise trigger the check control message. This is possible if for instance the Hall sensor of the longitudinal drive motor is defective. A repair in the garage/ workshop will therefore be necessary. The seat must be calibrated after the repair.

Check Control Message	Meaning	Information in Central Information Display
	Seat must be recalibrated.	Seat calibration necessary.
	Seat-position recognition malfunctioning!	Seat-position recognition malfunctioning! Have the system checked by BMW Service at the next available opportunity.
	Rear seat not locked!	Rear seat/Backrest Left or right rear seat not locked. Increased risk of injury in the event of an impact because seat belt is ineffective!